CLAIMS:

1. In a method of fluid simulation where state of a fluid comprising of velocities is updated in the presence of impermeable objects having surfaces in a given region over discrete time steps by:

dividing the region into cells comprising a regular grid and then defining a velocity field which associated a velocity vector with each cell; and

recalculating the velocity field at each consecutive time step based on the state of the fluid on the previous time step and the effect of impermeable object surfaces via Navier-Stokes equations comprising calculation of advection and pressure effects;

the improvement comprising:

assigning a value to the velocity vectors, associated with the cells contained within the impermeable objects when the velocity field is used for the calculation of the advection and pressure effects, which is copied from the closest fluid containing cell; and

when the value includes a normal component which would cause motion of the fluid into the object, removing the normal component.

2. The method according to Claim 1 wherein the impermeable objects have velocities defined on their surfaces, the method including:

determining the relative velocity by taking the difference between the velocity from the closest fluid containing cell and the velocity from the nearest impermeable object surface; and

removing the normal component which would cause motion of the fluid into the object by taking the dot product of the relative velocity with the surface normal of the nearest impermeable object surface, and when it is negative, adding to the velocity a vector which has a magnitude of the dot product times the magnitude of the velocity and points in the direction of the surface normal of the nearest impermeable object surface.

3. The method according to Claim 1 wherein a fluid volume including a surface defined by level set values representing the distance to the surface is advected according to the velocities, the method including:

storing velocity data only for those cells which are inside or near the fluid volume; and

storing level set values only for those cells which are near the fluid surface.

4. The method according to Claim 1 including:

obtaining the impermeable object surface velocities, the impermeable object surface normals; and determining whether a cell is inside or outside of the impermeable objects using the level set and velocity field as described in Claim 7.

5. The method according to Claim 1, including:

obtaining the velocity from the closest fluid cell by extrapolating the velocities from the cells just outside the impermeable object surface into the cells inside the impermeable object surface satisfying the constraint that the gradient of the extrapolated velocities along the direction of the impermeable object surface is zero.

6. The method according to Claim 1 wherein the impermeable objects may be deforming and including a transformation along a path, the method including:

computing the impermeable object surface velocities as the sum of the velocity caused by the transformation along the path and the velocity caused by the deforming of the object surface.

7. In a method of fluid simulation where state of a fluid is updated in the presence of impermeable objects having surfaces in a given region over discrete time steps by:

dividing the region into cells comprising a regular grid; and

recalculating the fluid state at each consecutive time step based on the state of the fluid on the previous time step and the effect of impermeable object surfaces via Navier-Stokes equations;

the improvement comprising:

defining the impermeable objects as a level set with level set values representing the signed distance to the nearest impermeable objects surface, in conjunction with a velocity field comprising the velocities of the neareast impermeable object surface.

8. The method according to Claim 7 including:

storing level set values only for those cells which are near the impermeable object surface; and

storing velocity values only for those cells which are near the impermeable object surface.